

# Editorial

## Special Issue on Green Power Supplies

A TRADITIONAL field for power Electronics, Power supply technology is still the key application area that covers computing, telecommunication, server, data center, industry, automobile, electric vehicles (EVs), medical, appliance, solar inverters, and so on. Recent advances have made power supplies greener than before, as they become more energy efficient, cost effective, and environment friendly. Recent development in silicon power device and in wide bandgap devices has improved power density and conversion efficiency. These emerging devices, together with improvements in topologies, cooling, and passive components, are shrinking the size. Magnetic material, passive component design, and integration have contributed to miniaturization with improved manufacturability. Digital control, with low-cost DSP and other control ICs, has advanced the overall performance significantly.

As an echo to these power supply emerging developments, IEEE Power Electronics Society and China Power Supply Society initiated a successful collaboration on International Power Electronics and Application Conference and Exposition (PEAC 2014) in Shanghai, China, November 5–8, 2014, which was mainly focused on green power supply industry in Asia. Based on the success of PEAC 2014, we proposed this special issue for the emerging power supply technologies. This special issue received 66 original submissions of which 17 were accepted to present the latest and most advanced technologies of green power supply. The special issue is classified into four groups: dc–dc converters, grid inverters for photovoltaic (PV), stability and control of grid inverters, and reliability of power converters.

The first group deals with dc–dc converters. The first paper provides the variable frequency multiplier concept to enable *LLC* converters adapted to wide input and/or output voltage ranges. The second paper presents an active snubber cell which can be inserted in N-phase interleaved dc–dc converters to realize the soft switching condition. The third and fourth papers propose high step-up zero-voltage-switching (ZVS) dc–dc converters. The fifth paper introduces high voltage dc–dc converter for X-ray application. The sixth paper discusses the reduction of the output filter size for the dc–dc converter by using the saturation-gap biasing topology.

The second group deals with grid inverters for PV. The first paper presents multimodule converter (MMC)-based solar inverter topology by replacing arm inductor of MMC with an open-end transformer so as to reduce cell capacitor. The second paper provides a common mode filter design method for transformerless ZVS full-bridge inverter for residential

application with high power density. The third paper provides a two-level control strategy for distributed PV inverters with the upper level using cooperative control and the lower level using model predictive control. The fourth paper introduces a push–pull high-frequency-link single-phase inverter. The fifth paper presents sliding mode control for a cascaded two-level inverter for the PV application.

The third group deals with stability and control of the grid inverters. The first paper discusses the impact of the ac-bus voltage control on the stability of dc-bus voltage control in voltage source converter (VSC) connected to weak grid. The second paper provides resonance suppression scheme for a single-phase grid inverter with the *LLCL* filters. The third paper provides neutral-point balancing control method for VIENNA-type three-level rectifier. The fourth paper introduces a reactive power control strategy to reduce the capacity of the charger for EVs on single-phase three-wire distribution feeders. The fifth paper describes a current-source high-frequency-link inverter, which comprises two dc–dc isolated converters connected in a differential-mode configuration, thereby yielding an inverter output.

The fourth group deals with the reliability of power converters. This paper presents lifetime prediction of MMC based on the fatigue load according to the working condition and the mission profile.

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